

What is claimed is:

1. A method for removing a halogen-containing residue from a substrate, the residue formed during etching of the substrate, the method comprising the steps of:
 - heating the etched substrate to a temperature of at least 50°C; and
 - exposing the heated substrate to a plasma that removes the halogen-containing residue.
2. The method of claim 1, wherein the exposing step further comprises maintaining the temperature of the substrate between from about 50°C to about 450°C.
3. The method of claim 1, further comprising forming the plasma by energizing a gas mixture in a remote plasma reactor.
4. The method of claim 1, wherein the halogen-containing residue comprises bromine.
5. The method of claim 4, wherein the plasma comprises an oxygen-containing gas.
6. The method of claim 5, wherein the oxygen-containing gas comprises an oxidizing agent selected from the group consisting of oxygen, water vapor and ozone, and an additive selected from the group consisting of nitrogen, argon and helium.
7. The method of claim 1, wherein the halogen-containing residue comprises chlorine.
8. The method of claim 7, wherein the plasma comprises a hydrogen-containing gas.
9. The method of claim 8, wherein the hydrogen-containing gas comprises hydrogen, water vapor, oxygen and nitrogen.

10. The method of claim 1, wherein the heating step comprises heating the substrate in a gas mixture of oxygen and nitrogen.
11. The method of claim 10, wherein the exposing step further comprises maintaining the temperature of the substrate at about 250°C.
12. The method of claim 6, wherein the flow ratio of oxygen to nitrogen is about 10:1.
13. The method of claim 9, wherein the flow ratio of oxygen to hydrogen is from about 150:1 to about 5:1, and the flow ratio of hydrogen to water vapor is from about 2:1 to about 1:1.
14. The method of claim 9, wherein the flow rate of forming gas is from about 500 to 5000 sccm.
15. The method of claim 9, wherein the flow rate of water vapor is from about 100 to 3000 sccm.
16. The method of claim 9, wherein the flow ratio of oxygen to water vapor is from about 10:1 to 3:1.
17. The method of claim 6, further comprising maintaining the oxygen-containing gas at a pressure of from about 0.5 to about 2 Torr.
18. The method of claim 6, wherein the duration of the exposing step is from about 15 to about 90 seconds.
19. The method of claim 9, further comprising maintaining the hydrogen-containing gas at a pressure of from about 0.5 to about 2 Torr.
20. The method of claim 9, wherein the duration of the exposing step is from about 15 to about 60 seconds.

21. A method for removing a halogen-containing residue from a substrate, the residue formed during etching of the substrate, the method comprising the steps of:
 - providing a substrate having a film stack on the substrate with a patterned mask on the film stack;
 - etching the film stack on the substrate;
 - heating the substrate to a temperature of at least 150°C; and
 - exposing the heated substrate to a plasma that removes the halogen-containing residue.
22. The method of claim 21, wherein the exposing step comprises maintaining the temperature of the substrate between 50°C and 400°C.
23. The method of claim 21, further comprising forming the plasma by energizing a gas mixture in a remote plasma reactor.
24. The method of claim 21, wherein the etching step comprises etching the polysilicon layer.
25. The method of claim 21, wherein the etching step comprises etching the substrate with a gas mixture comprising a halogen gas and a reducing gas.
26. The method of claim 21, wherein the halogen-containing residue comprises bromine.
27. The method of claim 26, wherein the plasma comprises an oxygen-containing gas.
28. The method of claim 27, wherein the oxygen-containing gas comprises an oxidizing agent selected from the group consisting of oxygen, water vapor and ozone and an additive selected from the group consisting of nitrogen, argon and helium.

29. The method of claim 21, wherein the halogen-containing residue comprises chlorine.

30. The method of claim 29, wherein the plasma comprises a hydrogen-containing gas.

31. The method of claim 30, wherein the hydrogen-containing gas comprises hydrogen, water vapor, oxygen and nitrogen.

32. The method of claim 31, wherein the heating step comprises heating the substrate in a gas mixture of oxygen and nitrogen.

33. An integrated processing system for removing from a substrate a halogen-containing residue, the residue formed during etching of the substrate, the system comprising:

- a central transfer chamber;
- an etch chamber coupled to the central transfer chamber;
- a residue removal chamber coupled to the central transfer chamber and adapted to remove the halogen-containing residue;
- at least one load lock chamber coupled to the transfer chamber;
- a robot disposed in the transfer chamber and adapted to transfer the substrate between the load lock chamber, the etch chamber and the removal chamber; and
- a controller for adjusting the parameters of the system as a function of the measurements performed by an optical metrology tool.

34. The system of claim 33, further comprising:

- a remote plasma source coupled to the residue removal chamber;
- a gas source providing a gas mixture of an oxygen-containing gas or a hydrogen-containing gas;
- a power source inductively coupled to the remote plasma source to form a plasma from the gas mixture; and
- a substrate support disposed in the residue removal chamber for supporting the substrate and maintaining the temperature of the substrate between 50°C and 400°C.